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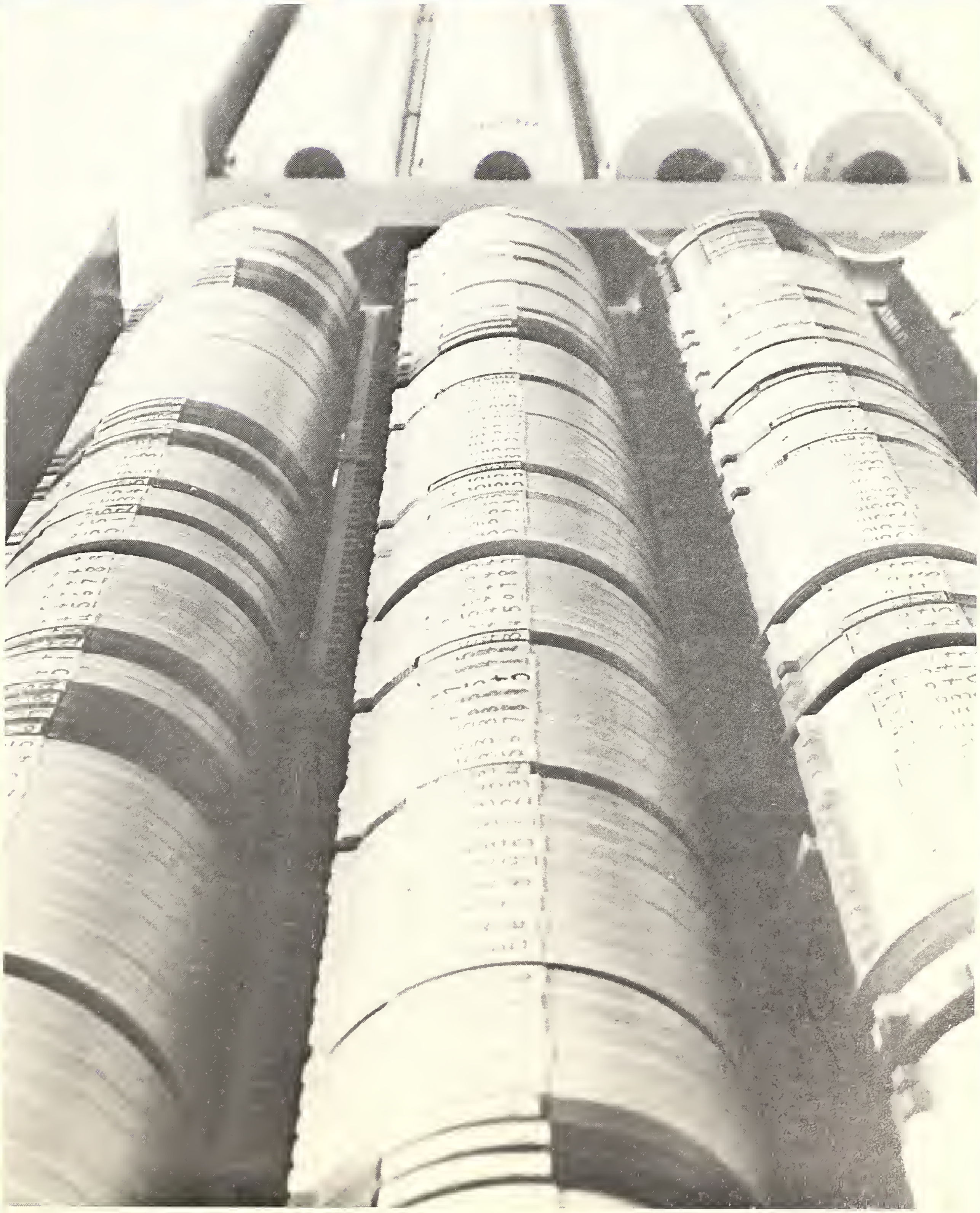

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MAGNETISM VS. MAGNETIC TAPE -- THE FINAL STORY

Editor's Note: The following article is reprinted from the Louisiana State University System Network Computer Centre Newsletter which reprinted it with permission from Indiana University's *Random Bits,* August 1979, Volume 14, Number 12, page 5. *Random Bits* reprinted it from the Kansas State University Computing Center *Newsletter,* which, in turn, adapted it from the June 1976 issue of Arizona State University's *Newsletter* by way of the August 1978 *Computing Center Newsletter* of the University of Alabama in Birmingham.

The National Bureau of Standards Institute for Computer Science and Technology has published findings of experiments made to determine the truths about erasing magnetic tapes.

MYTH: When the night watchman puts his flashlight with a magnetic holder on the tape storage rack, it's likely to cause data loss on several tapes.

TRUTH: A horseshoe magnet strong enough to lift 40 pounds was placed in direct contact with the outer flange of a tape reel. The signal level on the first 350 feet of the tape was reduced by up to 80 percent, causing a loss of data. Beyond 350 feet, there was no loss of data. When the same magnet was held one inch from a tape, no loss of data resulted.

Magnetic field strength falls off approximately as the cube of the distance from the magnet. Thus, distance from the magnet is much more important than the size of the magnet. For example, a magnet with a 40 pound pull, held at a distance of two inches, sets up a magnetic field only one-fourth as strong as a magnet with a 20 pound pull held at the distance of one inch.

Technically, magnetic field strength is measured in oersteds (Oe.). The horseshoe magnet used by NBS was a 1,000 Oe. magnet. The read/write head of a tape drive typically has a field strength of 750 to 1,500 Oe. A strength of 200 Oe. is usually sufficient to cause data loss on a tape, but 150 Oe. is usually not.

The conclusion is that almost any small magnet can cause data loss when placed in direct contact with a tape, but at even a small distance, the chance of data loss is negligible.

MYTH: Airport metal detectors can erase tapes.

TRUTH: Tests performed at Washington National and Dulles International airports showed no instance of erasure or loss after tapes were moved through metal detectors in many different locations within the detector. The magnetic field of 5 Oe. used by these devices is far too weak to cause any significant signal loss. Handheld metal detectors caused no data loss, nor did x-ray inspection. The tape user can set his mind at ease in airports.

MYTH: Hiding a magnet in a tape vault will gradually erase recorded data.

TRUTH: The time exposed to a magnet is not a factor. The particles in a recorded tape change their signal levels and magnetic directions in a few billionths of a second. If the magnet is strong enough to erase, it will do so immediately.

MYTH: A large electromagnet, such as the type used for lifting scrap metal in a junk yard, could be concealed in a van outside the comptuer center and a properly aimed burst of magnetism could erase all the tapes within.

TRUTH: This theory was tested in a scrap yard by placing a large lifting magnet directly over tapes. Again, it is the distance from the magnet that is most important. At 1.3 feet, the closest distance tested, there was no loss of data.

continued...

MAGNETISM continued

MYTH: Radiation around a microwave oven can erase tapes.

TRUTH: Cassettes were warmed inside a microwave oven with no loss of data.

MYTH: X-rays erase tapes.

TRUTH: X-ray intensities sufficient to kill a man caused no loss of data.

MYTH: Nuclear radiation can erase tapes.

TRUTH: Three megarads of gamma radiation over a 1 1/2 hour period caused no loss of data.

UTCS GRAPHICS AID BRAIN WAVE STUDIES

Dr. Joel Whitton is a UTCS user who is currently involved with brain wave research. His ongoing project is briefly described in the following abstract of a presentation given by Dr. Whitton at Mount Sinai Hospital, Toronto. References to the UTCS graphics capability called KIG will be of special interest to readers of *COMPUTERNEWS.*

Analysis of the Electroencephalogram

The electroencephalogram (EEG) is a recording of the minute electrical potentials on the scalp coming from the cortex of the brain. These visual records can be a useful addition to the medical diagnosis and management of people with brain-behaviour disorders. However, the standard EEG is limited in the investigation of specific cognitive processes and disturbances (i.e., in learning disabilities in children).

There are newer methods (1) to challenge the brain to process information and then subsequently measure performance under the stress of stimuli and (2) to quantify EEG measures and then allow a mathematical comparison with normals, over a period of time. These demonstrate that an index of the functional performance of the brain is obtained. The new methods are possible not only because of our better conceptual understanding of the EEG, but also because of the application of advanced mathematical methods to EEG analysis and recent advances in computer technology.

A substantial problem is data management. Simply, there is a lot of data. The data base from one subject is approximately 5 million numbers. The problem is to keep track of all these numbers and to reduce them to a manageable, easily interpretable form. The aim is to avoid filling a wheel barrow with paper.

A similar problem exists with Computerised Axial Tomography or the CAT scanner. To sit and watch the monitor display slices of brain tissue is deceivingly simple. Vast amounts of X-ray data are gathered and stored so as to allow later construction. of the displays. However, we have a somewhat more complex problem: from the EEG tests there are no obvious brain structures or representations on which to focus. In the CAT scanner we can look at known physical anatomical structures and represent them visually on a TV screen as they exist in the cranium. The question was, "How can we represent conceptually the abstract EEG data?" For example, one of our analysis steps is a measure of the third moment structure of the EEG called a trispectrum or trispectral analysis. There is some evidence that this method and the family of methods it is from will provide information about the interrelationships of the so-called brain wave frequency generators. The trispectrum produces a four dimensional array of data.

No matter how elegant or useful a method might potentially be, it is not practical if the results cannot be represented in an under-

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UTCS GRAPHICS continued

standable manner.

We have been fortunate that the University of Toronto Computing Services has developed an advanced graphic capability called KIG. In a collaborative effort we are interfacing our data with that package. This is an interactive graphics package that will allow us to represent abstractions such as four dimensional data arrays in an easily interpretable form. Though we are working on other examples of displays, this one illustrates one aspect of the technology to be resolved.

We are indebted to Don Gibson and Herbert Kugel and their staff for assistance in helping us develop this technology.

Other statistical procedures that we implemented include spectral analysis and coherency analysis both of which are more or less widely known in EEG analysis. We are also implementing certain methods that are still under investigation as regards the EEG (i.e., factor analysis).

We will be studying methods that have not yet been applied to the EEG analysis. One is called the Cepstrum which is suitable for analyzing repetitive events. We anticipate that this method may assist in identifying epileptic-like electrical abnormalities of the brain that are not evident on visual inspection of the EEG.

In our lab we are using a PDP-11/02 for data acquisition. We designed, and had programmed, a table-driven data acquisition system which allows considerable flexibility in experiment method. Data is amplified by EEG amplifiers, digitized with a 16 channel ADC and stored on magnetic tape. This data is then transferred to the IBM 3033 processor. Interestingly, all of our analysis steps, including the advanced methods, were programmable using SAS. Our results - the SAS save files - become input for the KIG graphics package. In a future article we shall describe in detail these graphics and how they have contributed to the development of a clinical instrument that allows measurement of the functional performance of the brain.

Joel L. Whitton, MD, Ph.D
Dept. of Psychiatry
University of Toronto
Clarke Institute of Psychiatry

Herb Kugel

PUT APPEARS AGAIN

Last year UTCS operated a temporary High Speed Job Stream terminal in the McLennan Labs. This terminal, known as the Physics Undergraduate Terminal (PUT), is once again in operation.

PUT is located in Room 200 in the McLennan Labs, directly above the main entrance to this building. The terminal consists of 14 keypunches, an IBM 2501 card reader and an IBM 1403 printer. Adjacent to the terminal area is a work area where a UTCS advisor resides. The terminal is open from 8:00 a.m. until 10:00 p.m., Monday through Thursday, and from 8:00 a.m. until 5:00 p.m. on Friday. Advisors are on duty from 10:00 a.m. until 7:00 p.m., Monday through Thursday, and from 10:00 a.m. until 5:00 p.m. on Friday. Please note that PUT is closed all day Saturday and Sunday.

The purpose of re-installing this temporary terminal is to provide more facilities for student computing. Based on the previous success of PUT, UTCS believes that this temporary facility will be appreciated by the students who use it.

Bob Chambers

SERVICE SELECTION FOR ASYNCRONOUS TERMINALS

Recent users of UTCS interactive services (DEC-10, TS0, WYLBUR, APL, ATMS) may have noticed some changes when connecting to their favourite service. Some are due to the connection through PACX; others are due to new software in the IBM 3705 communications controller. This article reviews these changes and describes the user prologue currently required to attach to a service.

At first glance, it may appear that UTCS has interposed unnecessary complexity between user and service. However, the connection prologue is far simpler than it appears and will be quickly mastered by the user who initially exercises patience. In exchange, the user connecting through PACX will have the capability of connecting to all our major services, using higher data tranmission rates (modem and terminal permitting).

The IBM software will automatically detect the user's terminal speed, up to 1200 bps. (The DEC-10 front end will also provide this capability in future.)

We are currently in phase I of attaching the asynchronous terminals to PACX. During this phase, hardwired terminals from UTCS user areas on the St. George Campus will be connected as will other users having dedicated links. The dial-in modems will be connected at a future date. The exception is the 1200 bps, 212A modems, currently reachable at 978-3959 for TS0/WYLBUR and 978-5737 for APL/ATMS. Thus, users connecting through the low speed dial-in modems will not be affected by PACX at this time. They will notice only the new service selection requirements of the IBM front end software.

The connection procedure, i.e., attaching a user's terminal to an interactive service, consists of two basic selections -- machine selection through PACX and service selection through the front end of the selected machine. These are described below.

Machine Selection through PACX

Machine selection through PACX occurs in two distinct steps. First, in the PACX *CONNECT STEP,* the user must call PACX to let it know a connection will be requested. Second, in the *CLASS SELECT STEP,* the user specifies the class of computer port requested. These steps are analogous to those required in making a phone call -- lift handset and wait for dial tone, then dial the digits.

Through PACX, these steps are very much dependent on the line drivers used to connect the terminal to PACX. It is expected that the user's major difficulty will be in step one, connecting to PACX. However, after the first couple of tries, this should be mastered.

The types of line drivers connected to PACX are 20 ma current loop driver; leased line 103 type modems (<300 bps); RS-232 drivers; dial-in modems; LDS 125s; LDS 120s. (For a description of these drivers and their line requirements, please see the March and April issues of COMPUTERNEWS.)

The PACX *CONNECT (and DISCONNECT) STEPS* for these drivers are as follows:

20 ma loop

1. Switch on driver after it has been off for at least three seconds. On some terminals, the driver is turned on when the terminal is turned on.
2. To disconnect, switch off driver for at least one second.

Alternatively, these connect and disconnect steps may be activated by generating a long

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SERVICE SELECTION continued

SPACE (the logical '0' level) by depressing the terminal BREAK key. The BREAK should be depressed for 3 or more seconds for connect and 1 or more for disconnect.

Note carefully the following, when using 20 ma loops.

1. There is no response from PACX at the end of the PACX connect step. The user must follow through with the class select step. The user, at this point, has no indication of success or failure.
2. When the 20 ma loop is first turned on by the user, it is equivalent to the end of a long SPACE connect and the user is ready to proceed with the class select step. If the user now presses the BREAK key, in the mistaken belief that he is initiating the connect, the terminal will be disconnected. Thus all following actions for the class select step will be ignored by PACX and the user receives no response. In this case, the user should restart with the connect step.
3. On some terminals, the BREAK produces timed SPACES of about 50 msec. duration and cannot be used to generate the long SPACE for connect and disconnect. For these, powering the driver off and on will produce the needed long space.

Leased Line 103 type modems

1. Switch driver on (or terminal in some cases) for PACX connect.
2. Switch driver off for PACX disconnect.

RS-232

1. Switch terminal on for PACX connect. On some terminals, such as the Volker-Craig 404, switching from the LOCAL mode to the REMOTE mode accomplishes this.
2. For disconnect, switch terminal off (or to LOCAL mode).

Dial-in Modem

1. Place receiver in acoustic coupler.
2. Dial the telephone number for the modem equivalence class. Upon receiving the answering modem tone, you are connected.
3. Hang-up for disconnect.

LDS 125

1. Switch driver on. Connect light indicates connection.
2. Switch off for disconnection.

LDS 120

1. Switch driver on for connection. By modifying the LDS 120 terminal plug, connection can be controlled from the terminal.
2. Switch driver off for disconnection, or switch terminal off if plug is suitably modified.

In UTCS user areas, the appropriate procedures for the attached line drivers will be posted near the terminal. Users of private terminal areas may obtain these instructions from their Computing Services Representative (CSR).

Step 2, the *CLASS SELECT STEP*, is terminal dependent. The first character, 'CR' (carriage return) for ASCII terminals and '.' (period) for IBM 2741 or 3767 terminals, is the autobaud character and is used by PACX to determine the terminal speed and mode. The next two characters specify the selected class. The class select characters specify the machine and the desired speed range. The class characters used for the major UTCS machines are listed below

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SERVICE SELECTION continued

the terminal procedure.

The following observations may be of help to users connecting through PACX.

1. After you have completed the PACX connect step, you have twenty seconds to initiate the class select step. However, don't rush. Wait one or two seconds before entering the autobaud character. Otherwise, PACX may miss the autobaud character and misinterpret the class select characters. You will then have to repeat from the connect step.
2. Make sure your terminal speed can be matched to a speed in your selected class. PACX does not make this check and will connect you. A speed mismatch results in incoherent communication.
3. All PACX ports are assigned a port class, whether or not a real computer port is attached. If you mistype the port class characters, you may get connected to an empty port and receive no response from the port.
4. Occasionally, a computer port, due to hardware or software failure, may be in a 'hung' or 'dead' state unknown to PACX or anyone else. If you have the misfortune of getting connected to a bum computer port, and have checked that 1, 2, or 3 above have not occurred, please don't disconnect. Call operations at 7393. They will ask you to disconnect while monitoring the PACX console. This may help identify the port and allow operations to disable it, preventing other users from connecting until it is repaired.

Service Selection

Having successfully completed the PACX *connect* and *class select steps,* PACX becomes transparent and you may now proceed with the service select step. With the DEC-10, hitting carriage return (CR) will return a period (.), the monitor prompt. You can then proceed with the login. On the IBM 3705s, service selection requires two characters, an autobaud character (the CR) and a service select character (t-TS0, w-WYLBUR, l-APL, and a-ATMS). After the autobaud character is received, the 3705 will prompt the user for the service select character. The user has 18 seconds to provide each of these characters. Otherwise a disconnection occurs.

Future Developments

This service selection procedure will be greatly simplified by future enhancements. In the fall term all asynchronous lines to the IBM machines will be merged into one communications controller capable of connecting to all services. At a later date, an enhanced version of the PACX will be installed. This version, PACX-IV, will have the capability to accept alphanumerically defined services (e.g., TS0, WYLBUR, APL, etc.) and to pass a string of characters to the computer ports. This will allow PACX to set the computer port speed and specify the service select character, merging the machine select and service select steps in PACX.

Walter Rosocha

PERSONNEL CHANGES

Academic Computing Services has two new members. Ted Sikorski is the Terminal Support Advisor in the Engineering Annex and Grant Davis is the TSA at Scarborough.

Barry Lay has joined the Systems Group as a Programmer and Judy Burns is the new Clerk Typist in the Engineering Annex. Cecelia Welch has also joined the Systems Group as Systems Librarian. Welcome!

Last month Phil Girouard and Greg Hill both left CSS to pursue careers in private industry. Janet Brettingham has left her position as Tape Librarian to join a bank. Best wishes to Phil, Greg and Janet in their new endeavors.

Theresa Veira

UTCS SYSTEMS

3033/N8A PROCESSOR

- located in McLennan Physical Laboratories
- provides General Purpose Job Stream, High Speed Job Stream, TSO, WYLBUR
- 8 megabytes of memory
- MVS with JES2

3033/N8B PROCESSOR

- located in McLennan Physical Laboratories
- provides administrative IMS/VS DB/DC Batch, TSO, MVS/APL and ATMS services
- 8 megabytes of memory
- MVS with JES2

DECSYSTEM-10 Model 1090

- located in Sandford Fleming
- provides General Purpose Time-Sharing
- 256 K - 32 bit words of memory
- TOPS-10 operating system

COMMUNICATIONS & SMALL SYSTEMS (CSS)

- located in SF106
- DEC GT44 System with PDP-11/40 CPU
- 2 Z80 based microcomputers
- Radio Shack TRS-80
- Western Digital Pascal MicroEngine
- Apple II Plus
- DEC GT40 System with PDP-11/05 CPU
- provides specialized graphics and interactive graphics
- provides online and real-time computing services, data acquisition and minicomputer services

UTCS DIRECTORY

POSITION	ROOM	CENTREX PHONE NUMBER
Director		
Dr. Doron Cohen	MP350	8948
Associate Directors		
Rein Mikkor	MP350	5058
Al Heyworth	MP350	4936
Faculty Liaison Officer & Manager, Text Services		
Dr. Frank Spitzer	MP350	4619
Manager, Communications & Small Systems		
Eugene Siciunas	MP350	4967
Manager, Operations		
Derry Cox	MP350	7092
Manager, Systems		
Ward Beattie	MP350	3579
Manager, Academic Computing Services		
Ralph Lombardi	MP350	7130
Manager, Administrative Computing Services		
Bill Lauriston (Acting Manager)	SG201	6877
Manager, Services Support		
Don Gibson	MP350	5568
Administrative Officer		
Suzan Fawcett	MP350	4428
Information & Accounting Office		
General Inquiries	EA206	4990
Accounts		
Aggie Stevens (U of T)	EA206	8702
Sylvia May (External)	EA206	7148
Supervisor, Accounting & Information Services		
Marg Doherty	EA209	3960
Access Codes		
Michelle Mule	EA206	8703
Supervisor, Communication Systems		
Walter Rosocha	SF105	7087
Programming Services		
Bill Lauriston	SG201	6877

UTCS DIRECTORY continued

Entry Services

Supervisor		
Vera Cabanus	MP368	5040
Text Entry		
Dale Wright	MP368	4565
Data Entry		
Zelda Anderson	HU405	5273
Keypunching		
Dale Wright	MP368	4565

Tape Librarians

Academic Services	MP368	7319
Administrative Services	MP368A	6693

Supervisor, Applications

Herb Kugel	SG304	7286

Computing Services Representatives

Engineering Annex Terminal		
Sue Chong	EA201	4357
Program Advisors	EA103	4516
Time-Sharing Support		
TS Advisors	SG204	6465
John Mavity	SG204	7109
Erindale		
Peter Wall	2043	828-5311
Scarborough		
Bob Blackburn		284-3173
Arts and Science		
Bill Fehlner	SS2133	6509
New Physics		
Bob Chambers	MP1202	8823
External		
Ihor Prociuk	SG205	6875,6885

Supervisors, Operations

Paul Scarborough (IBM 3033N8A)	MP335	6220
Krishna Patnaik (DEC-1090 & CSS)	SF106	4086
Dave Wong (IBM 3033N8B)	MP335	6864

Key:

EA = Engineering Annex
SG = 49 St. George
HU = 215 Huron St.
MP = McLennan Physical Laboratories (New Physics)
SF = Sandford Fleming
SS = Sidney Smith

Job and System Status Queries

SYSTEM/3033,TSO	7373
ATMS/APL	6234

Time-Sharing Services	Dial-Up
APL,ATMS	7200 Centrex 7201 Non Centrex
TSO,WYLBUR	6200 Centrex 6201 Non Centrex
DEC-10 Services	4224 Centrex 4244 Non Centrex
PHONE-IN ADVISING	6465

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